

COSEWIC
Assessment and Update Status Report

on the

Northern Bobwhite
Colinus virginianus

in Canada



ENDANGERED
2003

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

Please note: Persons wishing to cite data in the report should refer to the report (and cite the author(s)); persons wishing to cite the COSEWIC status will refer to the assessment (and cite COSEWIC). A production note will be provided if additional information on the status report history is required.

COSEWIC 2003. COSEWIC assessment and update status report on the Northern Bobwhite *Colinus virginianus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 20 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

James, R.D. and R. Cannings. 2003. COSEWIC update status report on the Northern Bobwhite *Colinus virginianus* in Canada in COSEWIC assessment and update status report on the Northern Bobwhite *Colinus virginianus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-20 pp.

Previous report:

Page, A.M. and M.J. Austen. COSEWIC status report on the Northern Bobwhite *Colinus virginianus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 39 pp.

Production note:

This status report was originally brought to COSEWIC in 1999 but was deferred. This report has now been reformatted to fit the current COSEWIC Status Report template. The text of the report has also been edited for consistency as various addenda provided for assessment in November 2003 by the COSEWIC Birds Specialist Subcommittee and the Ontario Ministry of Natural Resources have been incorporated into the final text. This report was overseen and edited by Richard Cannings, COSEWIC Birds Specialist Subcommittee Co-Chair.

For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, ON
K1A 0H3

Tel.: (819) 997-4991 / (819) 953-3215

Fax: (819) 994-3684

E-mail: COSEWIC/COSEPAC@ec.gc.ca

<http://www.cosewic.gc.ca>

Également disponible en français sous le titre Évaluation et Rapport de situation du COSEPAC sur la situation du colin de Virginie (*Colinus virginianus*) au Canada – Mise à jour.

Cover illustration:

Northern Bobwhite — Illustration by Judie Shore, Richmond Hill, Ontario.

©Her Majesty the Queen in Right of Canada 2004

Catalogue No. CW69-14/6-2004E-PDF

ISBN 0-662-37078-3

HTML: CW69-14/6-2004E-HTML

0-662-37079-1



Recycled paper



COSEWIC Assessment Summary

Assessment Summary – November 2003

Common name

Northern Bobwhite

Scientific name

Colinus virginianus

Status

Endangered

Reason for designation

This species depends on native prairie and old meadow habitats that have largely disappeared from its southern Ontario range. Its population has declined drastically over the last 30 years and shows no sign of significant recovery. There is perhaps only one viable population in Canada, on Walpole Island, Ontario. The status of this species is complicated by the presence of many introduced populations which typically do not persist and whose genetic composition may pose a threat to native populations.

Occurrence

Ontario

Status history

Designated Endangered in April 1994. Status re-examined and confirmed in November 2003. Last assessment based on an update status report with an addendum.



COSEWIC
Executive Summary

Northern Bobwhite
Colinus virginianus

Species Information

The Northern Bobwhite, *Colinus virginianus*, (French name: Colin de Virginie) is a member of the New World quail family Odonotophoridae. It is a small, grouse-like bird; males have a black necklace, white throat and a white line above the eye, females have a buffy throat and eye-stripe.

Distribution

The Northern Bobwhite is found from southeastern Wyoming east to Massachusetts south through eastern Mexico to western Guatemala. In Canada it is found only in southern Ontario, with natural populations likely restricted to Walpole Island and perhaps the adjacent mainland. It has been introduced to many other areas with limited long-term success.

Habitat

The Northern Bobwhite requires an early successional habitat that can be provided in a variety of vegetation types. Minimally it requires an interspersed of grassland, cropland, and brushy cover. In Ontario it is now usually associated with cultivated lands rather than native prairie fringes.

In Ontario there were originally thousands of hectares of long-grass prairie in the extreme southwest. After settlement by Europeans, the creation of numerous small farms with diverse crops, inefficient harvest methods and large weedy hedgerows greatly enhanced the potential for bobwhites, and resulted in the tremendous population increase. But, through the previous century, the trend has been away from pasture and summer fallow, and natural prairie has been all but eliminated. Habitat fragmentation is also ongoing, and may be a more significant problem than overall habitat loss.

Biology

The nest is a shallow depression in the ground lined with plant material covered with grasses or vines arched over it for concealment. The mean clutch size is 12 to

16 eggs; incubation takes 23 to 24 days and the downy young can fly at an age of 6 or 7 days. Only one brood is typically raised per season at the northern edge of the range. Nests with eggs have been found from late May through mid-September, but the likelihood of successful hatching or fledging decreases as the season progresses. Mean nesting losses may be 60 to 70 percent. About 80 percent of the fall population consists of juvenile birds and the mean annual mortality of the species (including young birds) is about 80 percent. Adult annual survival is about 30 percent.

Northern Bobwhite are nonmigratory, but in fall some birds disperse several kilometres. Winter coveys require a minimum of 4.9 ha and rarely use more than 20 ha.

Population Sizes and Trends

What was probably a fairly small wild population in southwestern Ontario, prior to European settlement, underwent a considerable expansion following forest clearing in the early 1800s. The expanding population reached as far north as southern Georgian Bay and Kingston, although in any abundance, they were more limited to an area south of a line running from Goderich to Oshawa. Since reaching a population peak about the mid-1800s, numbers and extent of occurrence have steadily declined.

With declining populations, numerous releases of pen-reared birds were tried through much of the 20th century. But mortality rates of pen-reared birds have been found to be very high, and more recently such birds have been considered unsuitable for restocking. In the early 1970s there were estimated to be about 1055 coveys of quail in Ontario, each containing several birds, primarily in Lambton, Middlesex, and Elgin counties. Three successive severe winters in the late 1970s resulted in further population declines.

In the early 1980s, the breeding bird atlas and the subsequent rare breeding bird program 1989-1991 revealed a scattered distribution, with reports from only 79 squares (10X10 km) and a population estimate of between 232 and 1545 pairs.

In 1989-1990, an extensive mail survey in southwestern Ontario suggested the population had fallen to only about 185 quail in 16 coveys, and by 1994 it was considered that wild stock was probably persistent only in two disjunct areas in Aylmer and Chatham regions.

Data from three Breeding Bird Survey routes from 1966 to 2001 show a mean annual decline of 18.9 percent ($p=0.04$) in Ontario, a total decline of 99.9 percent over 35 years, or 88 percent per decade. By the 1990s the population may have stabilized at very low levels of 200 to 250 birds.

Similar declines have occurred in the United States. In Breeding Bird Surveys from 1965 to 1995 declines of 70 to 90 percent were noted in 80 percent of the states in which it occurs. Declines were greatest in the southeast, and less in the midwest, with numerous extinctions of local populations.

The second Ontario Breeding Bird Atlas (2001 - September 2003) has found Northern Bobwhite in only 19 squares after 3 years. The Extent of Occurrence has seemingly not changed, indeed the recent atlas effort has found bobwhite in 12 atlas squares in which they were not found in the 1980s. Whether these new sites are the result of introduction efforts is unknown, but that is the most probable explanation. On the other hand, bobwhite have not been found in 44 atlas squares that they were known to occur in during the 1980s, despite more than 20 hours' search effort in each of these squares.

Atlassing results and other observations suggest that natural, viable populations now exist in Canada only on Walpole Island. Surveys there in 1999 and 2000 suggest a population of about 230 birds.

Limiting Factors and Threats

Habitat quality and quantity are the main factors limiting populations, as natural prairie habitat has all but disappeared and agricultural habitats have become less suitable through intensification. Continued reintroduction efforts have been ineffective and may be contributing to the continuing population decline through the introduction of inappropriate genetic stock.

Special Significance of the Species

The Northern Bobwhite has one of the greatest public appeal ratings of any North American bird. It is a popular and challenging game bird in the U.S., on which more money is spent than any other. It has a most appealing song and appearance, making it an aesthetically valuable part of the rural atmosphere.

Existing Protection

The Northern Bobwhite was designated as Endangered by COSEWIC in 1994 (Page and Austen 1994). NatureServe lists the Northern Bobwhite as G5 (globally secure); the status in Ontario is S1S2 (imperilled). There is no hunting season for the species within its native range in Ontario.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species and include the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal organizations (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership, chaired by the Canadian Museum of Nature), three nonjurisdictional members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The committee meets to consider status reports on candidate species.

DEFINITIONS (After May 2003)

Species	Any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994.



Environment
Canada

Canadian Wildlife
Service

Environnement
Canada

Service canadien
de la faune

Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

**Update
COSEWIC Status Report**

on the

Northern Bobwhite
Colinus virginianus

in Canada

Ross D. James¹
Richard Cannings²

2003

¹Gateways Centre
R.R. # 3, S1480, Conc. 7
Sunderland, ON
LOC 1H0
21330 East Debeak Road
Site 11, Comp. 96, R.R. #1
Naramata, BC
VOH 1N0

TABLE OF CONTENTS

SPECIES INFORMATION	3
Name and classification	3
Description	3
DISTRIBUTION	3
Global range	3
Canadian range	3
HABITAT	6
Habitat requirements	6
Trends	7
Protection/ownership	8
BIOLOGY	9
General	9
Reproduction	9
Survival	9
Movements/dispersal	9
POPULATION SIZES AND TREND	9
LIMITING FACTORS AND THREATS	12
SPECIAL SIGNIFICANCE OF THE SPECIES	14
EXISTING PROTECTION OR OTHER STATUS	14
SUMMARY OF STATUS REPORT	14
TECHNICAL SUMMARY	16
ACKNOWLEDGEMENTS	18
LITERATURE CITED	18
BIOGRAPHICAL SUMMARIES OF THE REPORT WRITERS	19
AUTHORITIES CONSULTED	20

List of figures

Figure 1. Range of the Northern Bobwhite in North America	4
Figure 2. The range of the Northern Bobwhite in Ontario, 1856 to 1954.	5
Figure 3. Distribution of Northern Bobwhite sightings from the Ontario Breeding Bird Atlas, 1981-1985.	5
Figure 4. Distribution of Northern Bobwhite sightings from the Ontario Breeding Bird Atlas, 2001-2003.	6

SPECIES INFORMATION

Name and classification

The Northern Bobwhite, *Colinus virginianus*, is a member of the New World quail family Odonotophoridae in the Order Galliformes (chicken-like birds). The French common name is Colin de Virginie.

Description

The Northern Bobwhite is a small, grouse-like bird; males have a black necklace, white throat and a white line above the eye, females have a buffy throat and eye-stripe. Males give a loud "bob-WHITE!" call in spring to advertise their presence, so despite their cryptic coloration they are relatively easy to census.

DISTRIBUTION

Global range

The Northern Bobwhite is found from southeastern Wyoming east to Massachusetts south through eastern Mexico to western Guatemala (Figure 1). Introduced populations can be found on a number of Caribbean islands, including the Bahamas, the Dominican Republic and Haiti; and in the Puget Sound region of Washington State, Malheur County, Oregon, and possibly western Idaho (Brennan 1999).

Canadian range

In Canada, the bobwhite is native only to southwestern Ontario (Figures 2, 3 and 4). Pen-reared birds have been released in various places in attempts to establish populations in southern British Columbia and Quebec. In Ontario, many pen-reared birds have also been released in an attempt to bolster populations here. But, pen-reared birds have a very high mortality and have not succeeded well. In southwestern Ontario some of the birds are still considered to be wild stock, although in most areas populations have probably been influenced by interbreeding with released birds.

The first Ontario Breeding Bird Atlas (1981-1985) found Northern Bobwhite in 79 atlas squares (10X10 km) over five years (Figure 3). The second Atlas (2001-September 2003) has found Northern Bobwhite in only 19 squares after 3 years (Figure 4). The Extent of Occurrence has seemingly not changed, indeed the recent atlas effort has found bobwhite in 12 atlas squares in which they were not found in the 1980s. Whether these new sites are the result of introduction efforts is unknown, but that is the most probable explanation. On the other hand, the bobwhite have not been found in 44 atlas squares that they were known to occur in during the 1980s, despite more than 20 hours' research effort in each of these squares.



Figure 1. Range of the Northern Bobwhite in North America (adapted from Page and Austen 1994).



Figure 2. The range of the Northern Bobwhite in Ontario, 1856 to 1954 (from Clarke 1954).

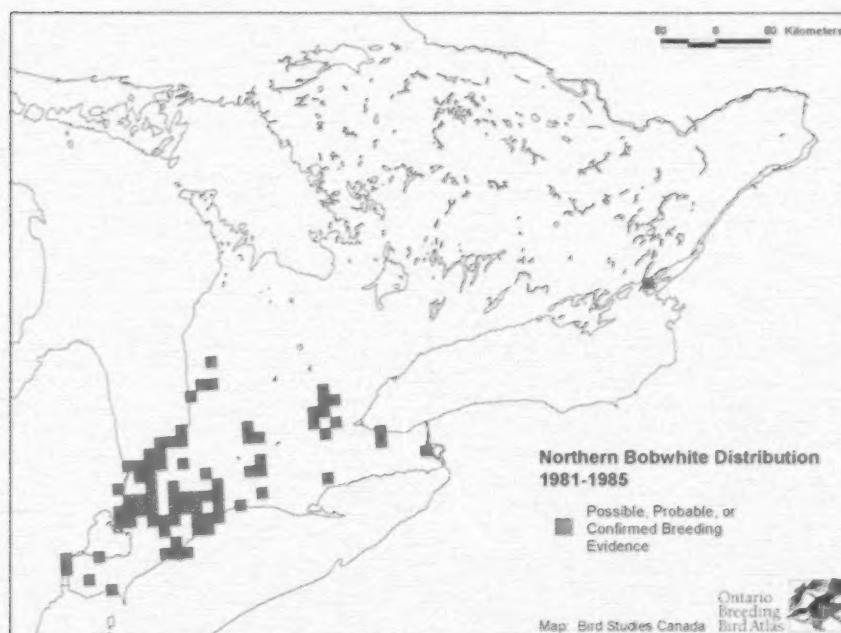


Figure 3. Distribution of Northern Bobwhite sightings from the Ontario Breeding Bird Atlas, 1981-1985.

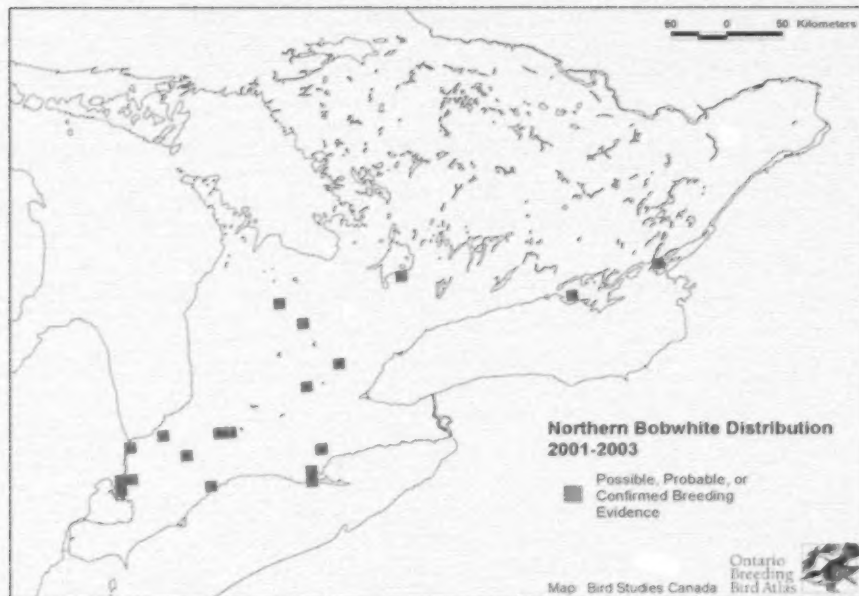


Figure 4. Distribution of Northern Bobwhite sightings from the Ontario Breeding Bird Atlas, 2001-2003.

HABITAT

Habitat requirements

The Northern Bobwhite requires an early successional habitat that can be provided in a variety of vegetation types (Brennan 1999). Minimally it requires an interspersed of grassland, cropland, and brushy cover. In Ontario it is now usually associated with cultivated lands, rather than native prairie fringes. They require grasslands for summer nesting, some feeding and limited roosting, croplands during summer and autumn for feeding, dusting, loafing and some roosting, and dense brushy cover for escape and roosting year round, and for feeding during autumn and winter.

It is also important that the three types of habitat are interspersed adequately so that all three types are available in close proximity. The amounts of each can vary considerably, as long as interspersed is high (Rosene 1969). It is also important that, once minimum interspersed requirements are met, that there be an adequate quantity of habitat. The population that can be expected will vary in the long term as the quantity through time that is available (Guthery 1997).

Trends

The value of agricultural lands has diminished in recent years as field sizes have increased, fencerows have been removed, pesticides and herbicides have depleted food sources and secondarily killed the birds feeding on them, and as brushy cover has been eliminated or increasingly isolated (Brennan 1999).

In Ontario there were originally thousands of hectares of long-grass prairie in the extreme southwest (Lumsden 1987). After settlement by Europeans, the creation of numerous small farms with diverse crops, inefficient harvest methods and large weedy hedgerows greatly enhanced the potential for bobwhites, and resulted in the tremendous population increase. But, through the previous century, the trend has been away from pasture (a 65% decline 1921-1986; and a further 19% decline 1986-1996) and summer fallow (a 44% decline 1931-1986; and a further 76% decline 1986-1996) greatly reduced the potential available habitat for bobwhite (Page and Austen 1994, Statistics Canada 1997). Available natural prairie has been all but eliminated in most places.

Perhaps more serious is the fragmentation of habitat. Bobwhites generally do not move long distances, and as suitable patches of habitat become isolated, there is a greater risk that a local population will be eliminated, with little or no chance of recolonization from other areas; reduced populations will also be slow to recover, and may never recover (Roseberry and Klimstra 1984). Furthermore, in human dominated landscapes, there are burgeoning populations of house cats, raccoons, foxes, coyotes, and skunks, that will be serious mortality agents, making survival even more difficult (Burger et al. 1995, Brennan 1999).

Overall, there has been a great reduction in available habitat in southern Ontario in the past century. Birds are now absent from what appears to be suitable habitat in many places, probably because of the isolation of these places. The main cause of decline in bobwhite populations in Canada has no doubt been this loss and fragmentation of habitat as it has been in many parts of the United States (Brennan 1991, Page and Austen 1994). But, populations have remained small after suffering losses to severe winter weather, because habitat has been fragmented with birds under heavy predation pressure. Adequate winter cover and food may be key to survival in Ontario, and where there is good habitat in sufficient quantity, they have persisted.

Bobwhite habitat is not currently protected in Ontario. Modern agricultural practices and urban development continue to threaten remaining habitat in most areas. However, there are recent encouraging developments that provide renewed optimism for bobwhite and other grassland species in southern Ontario. There is apparently much habitat in southwestern Ontario that appears to be suitable for bobwhites, where there are no remaining birds (Hunter 1990). With enhancement of intervening areas, and maintenance of existing areas, there is reason to believe that habitat can be provided to sustain much larger populations.

Protection/ownership

Much of the appropriate land is in private hands and there is a high degree of interest among landowners in bobwhite. Many are willing to participate in habitat enhancement programs. Walpole Island, managed by the Walpole Island Indian Band, is an important block of habitat, and the people are aware of the situation, and are amenable to maintaining birds there (P. Hunter and R. Ludolph, Pers. Comm., 1999).

Perhaps the most positive outlook for bobwhite and other grassland species evolves from the work of the Lambton Stewardship Council in the long-grass prairie restoration work that they are doing. They have already set out more than half a million plants, have nearly a million more ready to set out, are planning to seed several other areas, have two staff working on restoration and four others collecting and cleaning seed, are growing more than 70 different plants of native grasslands, and are undertaking controlled burns and removal of inappropriate brush to restore and maintain prairie areas. They are working with landowners to restore and connect grasslands in several parts of Lambton County as well as in other southern counties. While much of the work at the present time involves small patches of prairie wherever they can fit it in, they are concentrating on three areas in Lambton County, and supplying plants to several others, all with good bobwhite potential, or with existing birds that can benefit from additional habitat. About three quarters of the work being done by the Stewardship Council revolves around habitat restoration that will be of direct benefit to bobwhite, other grassland birds, butterflies and the native prairie plants themselves (R. Ludolph, Pers. Comm.).

While the prairie restoration programs have only recently begun (1993), they have expanded considerably in the past couple of years, and are expected to continue to grow in future. Plans are to have habitat suitable for bobwhite available in sufficient quantity to be able to maintain transferred birds from other areas whenever birds become available, if local birds do not quickly benefit.

Surveys conducted in the summer of 1999 also indicated that in the area where bobwhite are doing well, they have excellent winter cover, enabling them to survive winter snow and ice conditions. Tall-grass prairie restoration also provides tall rank growth that makes good winter cover for bobwhite. However, there are a couple of factors that may make survival more difficult. Burning is apparently practiced to renew the prairies. That in itself is not a problem if only small areas are affected. But, especially in dry years more may be burned than is good, and if done in autumn and winter as it sometimes is, could decrease winter survival (A. Woodliffe, Pers. Comm.).

BIOLOGY

General

As is typical for the family (but not for other gallinaceous birds), males contribute to nest-site selection, nest-building, incubation and care of the young.

Northern Bobwhite are monogamous. Winter coveys require a minimum of 4.9 ha and rarely use more than 20 ha.

Reproduction

The nest is a shallow depression in the ground lined with plant material covered with grasses or vines arched over it for concealment. The mean clutch size is 12 to 16 eggs; incubation takes 23 to 24 days and the downy young can fly at an age of 6 or 7 days. Only one brood is typically raised per season at the northern edge of the range. Nests with eggs have been found from late May through mid-September, but the likelihood of successful hatching or fledging decreases as the season progresses. Mean nesting losses may be 60 to 70 percent.

Survival

About 80 percent of the fall population consists of juvenile birds and the mean annual mortality of the species (including young birds) is about 80 percent. Adult annual survival is about 30 percent.

Movements/dispersal

Northern Bobwhite are nonmigratory and most individuals likely do not move more than a kilometre from their point of hatching. However, some individuals do disperse in the fall, when movements of up to 40 kilometres have been recorded.

POPULATION SIZES AND TREND

What was probably a fairly small wild population in southwestern Ontario, prior to European settlement, underwent a considerable expansion following forest clearing in the early 1800s. The expanding population reached as far north as southern Georgian Bay and Kingston, although in any abundance, they were more limited to an area south of a line running from Goderich to Oshawa (Clarke 1954 – Fig. 2). Since reaching a population peak about the mid-1800s, the numbers of birds and their range has contracted slowly but steadily.

With declining populations, numerous releases of pen-reared birds were tried through much of the 20th century. But mortality rates of pen-reared birds have been found to be very high, and more recently such birds have been

considered unsuitable for restocking (DeVoss and Speake 1995, Roseberry et al. 1987).

In the early 1970s there were estimated to be about 1055 coveys of quail in Ontario, each containing several birds, primarily in Lambton, Middlesex, and Elgin Counties (Holdsworth 1973). However, during three successive winters in the late 1970s, when weather, including icing, was severe, the population of bobwhite decreased further. In the early 1980s, the breeding bird atlas and the subsequent rare breeding bird program 1989-1991, revealed a scattered distribution, with reports from only 79 squares (Fig. 3). Many of the reported birds were also likely from releases, and not native wild birds. Overall, the abundance estimated during the atlas period was between 232 and 1545 pairs (Page and Austen 1994).

The atlas estimate came from a compilation of five years of data, and so may have been on the high side. The 1970s survey was also above the atlas upper limit, suggesting that, not only had the population not recovered from severe winters, but also that there had been a further decline (Page and Austen 1994).

Then in 1989-1990, an extensive mail survey in the southwestern ministry region suggested the population had fallen to only about 185 quail in 16 coveys (Hunter 1990). Further, it was considered that wild stock was probably persistent only in two disjunct areas in Aylmer and Chatham regions (Page and Austen 1994). The breeding bird survey from 1966 to 1998, while based on only three routes, recorded a highly significant decline in Ontario during the period. From 1980 to 1998, there were too few reports on only 2 routes to indicate significant change, although the trend was still downward (www.mbr-prec.usgs.gov/bbs/trend/trend98.html).

Through the 1990s no complete surveys were conducted to assess population change. However, it was generally felt that numbers had probably risen slightly to 200 to 250 birds, and the population appeared to have stabilized at that level through most of the decade (P. Hunter, pers. comm., 1999).

Data from the three Breeding Bird Survey routes in Ontario that reported Northern Bobwhite (from the U.S. Breeding Bird Survey website <http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa01.pl?02890>) show a mean annual decline of 18.9 percent ($p=0.04$) for Ontario between 1966 and 2001. This represents a total decline of 99.9% over 35 years, or 88% per decade.

In the United States, in recent years, the species has also experienced significant declines in most states. From 1965 to 1995, regional, state wide, and local declines of 70 to 90 percent were common in 80% of states where it occurred (Brennan 1999). Declines were greatest in the southeast, and less in the midwest, with numerous extinctions of local populations. There were significant declines from 1966 to 1998 in Michigan, Ohio, Pennsylvania, and New York according to the breeding bird survey results. Those trends were also

evident in the 1980 to 1998 period, but not significant in three of the four states (www.mbr-pwrc.usgs.gov/bbs.trend/trend98.html). In the U.S., most losses have been attributable primarily to habitat loss from changing land use in agriculture, forestry, and urbanization (Brennan 1999).

In 1994, when first considered by COSEWIC, plans were underway to undertake a trap and release program using wild caught birds from a similar climatic type in the U.S. The Ontario Ministry of Natural Resources and the Ontario Federation of Anglers and Hunters were prepared to undertake this release program in both Middlesex and Elgin counties. The release would have been at least 300 birds, in an attempt to link scattered populations as well as to increase overall numbers. This would have been followed by the release of an additional 200 to 300 birds the following year (Page and Austen 1994).

However, with the concomitant severe declines reported in most U.S. states, they have been reluctant to further reduce their own stock for such a release in Canada. But, contact is being maintained with states from which potential transfers could be made, as soon as feasible. Bobwhite have a high reproductive potential. If U.S. populations rebound, there is a high probability of releases being made in Ontario in the near future. This initiative has not been abandoned, and the intention is to undertake it as soon as it can be arranged (P. Hunter, Pers. Comm., 1999).

More serious concern for the species status exists from some other observers. Bobwhite are reported to have disappeared from a number of areas in the past decade where they were traditionally known (D. Sutherland, Pers. Comm. 1999), indicating a continuing decline in some areas.

Overall the present population of Northern Bobwhite in southwestern Ontario, whether previously inadequately surveyed, or more fully recovered than expected, appears likely to be above the estimate of 185 birds given in the previous status report (Page and Austen 1994).

In May-June 1999 and May-July 2000, the Rural Lambton Stewardship Network and members of the Walpole Island First Nation conducted Northern Bobwhite whistling surveys on Walpole Island First Nation (called west Lambton County in James 1999), which is thought to contain the majority of the remnant habitat used by native birds in Canada. MacIntyre (2002) and Hector (in prep.) have summarized the results of the surveys.

Sixty-five roadside stations were set up in grassland habitat on Walpole Island at least 1 km apart. Whistling surveys were conducted ½ hour before sunrise to 1½ hours after sunrise during late May to July 2000. At each station, surveyors noted the number of male Northern Bobwhite calling during a 3-minute period. It is estimated that 75% of the suitable habitat on the Island was sampled during the surveys. Not all stations could be sampled on one day. When

stations were sampled more than once, the maximum number counted at a station was used in the estimate.

The total number of calling males recorded on the survey ranged from 92 during a 5-day sampling period in late June to 155 over a 23-day sampling period in June. During the longer survey period there is a greater chance that males may have moved among survey stations which could inflate the estimate from double counting. For the purposes of determining status, the lower estimate (92 birds) is more appropriate.

If one assumes that each calling male represents a pair and that densities in the unsampled habitat are similar to densities in the areas sampled (both untested assumptions), then this would result in an estimated breeding population of 230 birds on Walpole Island in 2000. Further extrapolations can be made from this estimate to speculate on the brood production, the over-wintering population and severe winter survival (MacIntyre 2002, Hector, in prep.).

The total area of Walpole Island is 24,000 ha consisting of wetland, agricultural areas, prairie, savanna, hardwood communities and scattered residential development. An analysis of core Northern Bobwhite habitat was carried out on Walpole Island in 2000 using LANDSAT imagery, ArcInfo analysis and ground-truthing. A total area of 1840 ha (7.7%) was identified as prime grassland and savanna habitat. Many peripheral habitats, including forest openings, backyards, fencerows, dykes and even agricultural areas can be used by Northern Bobwhite as well.

It is generally believed that the Northern Bobwhite at Walpole Island are of native origin. There is less certainty about the numbers and origin of birds found away from Walpole Island. Although not a comprehensive survey, preliminary data from the Ontario Breeding Bird Atlas (3 of 5 years completed) show Northern Bobwhite from 17 locations away from Walpole Island (Figure 4). Ontario Ministry of Natural Resources staff report that additional unmapped locations are known but have not been consistently recorded or tracked. While some of these locations are on lands adjacent to Walpole Island, others are across a broader area of southwestern Ontario.

LIMITING FACTORS AND THREATS

As outlined in the Habitat Trends section, habitat loss is probably the most significant cause of the observed decline in Northern Bobwhite populations in Canada. Shrinking habitat blocks may become no longer suitable for the continued existence of bobwhite. Given the fragmented nature of much of the available habitat in southwestern Ontario, it is entirely likely that small isolated groups will continue to disappear. The relative size of a population is a primary factor promoting local extinctions (Bolger et al. 1991).

But, at the same time, might the disappearance have been influenced by the dilution of the native gene pool by released birds of unknown origin, not well adapted to Canadian winters and habitats? Northern Bobwhite are raised commercially for restocking purposes and for specialty restaurant menus. Prior to the passing of the Wildlife Conservation Act in Ontario in 1997, it was apparently possible for most anyone to get eggs, incubate them, and release hatched quail in Ontario without any records being kept. The genetic composition of these captive populations is clearly different from wild stocks (often differing in appearance as well, judging from specimens in the National Museum of Canada), but no study has been undertaken to quantify these differences. Since many of the small populations scattered through southern Ontario arise from repeated reintroduction attempts, there is a distinct possibility that the genetic composition of native populations could be compromised by interbreeding with released birds.

Hunting has never been considered to be a cause of population decline as long as adequate habitat is maintained (Brennan 1999). Although, a limited hunting season was still in effect in part of southwestern Ontario into the early 1990s, hunters realized the seriousness of the decline and not only voluntarily stopped hunting, but also began doing some habitat restoration where they could (P. Hunter, Pers. Comm., 1999). Hunting pressure was eliminated, and the hunting season has been closed now in southwestern Ontario. The population, which has appeared to be stable in the province for the past few years, has a chance to recover. Given the low population level, however, that might take some time, if not accompanied by releases of additional birds (Roseberry and Klimstra 1984).

Apparently feral cats are also a problem in the area (A. Woodliffe, Pers. Comm.), and can have serious effects on many breeding birds including bobwhite.

Severe winter weather where adequate suitable habitat was lacking has been responsible for further decimating the remaining bobwhite population. Persistent deep snow and prolonged cold are the most serious causes of winter mortality (Robel and Kemp 1997). In recent years the trend has been to milder winters with less snowfall. Weather does not seem to be a big problem in the U.S. except in the northern states within the range, where it may be a severe problem as it can be in Ontario. But, as the populations in Canada are essentially isolated from U.S. populations in this non-migratory species, we cannot expect to have any natural recruitment here from the U. S.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Northern Bobwhite has one of the greatest public appeal ratings of any North American bird. It is a popular and challenging game bird in the U.S., on which more money is spent than any other. It has a most appealing song and appearance, making it an aesthetically valuable part of the rural atmosphere. It is very unlikely that in Ontario its situation will be ignored or forgotten.

EXISTING PROTECTION OR OTHER STATUS

The Northern Bobwhite was designated as Endangered by COSEWIC in 1994 (Page and Austen 1994).

NatureServe lists the Northern Bobwhite as G5 (globally secure); the status within Canadian provinces and adjacent United States are: Ontario S1S2 (imperilled), British Columbia SEX (introduced and extirpated), Alberta SE (introduced), Michigan S4 (apparently secure), Minnesota SU (data deficient), Montana SE (introduced), New Hampshire SX (extirpated), New York, S4, Ohio S5 (secure), Pennsylvania SZS3 (vulnerable), Vermont SE, Washington SE.

SUMMARY OF STATUS REPORT

From historical populations associated with native prairie in southwestern Ontario, the bobwhite underwent a tremendous increase in numbers and its range as forest clearing took place after European settlement. From a population high in the mid-1800s, a slow decline took place up until about 1990. The main cause of the decline has been a loss of habitat as urbanization and modern agricultural practices have changed the landscape.

Numerous releases of pen-reared birds have taken place and are likely responsible for most of the remaining birds in southern Ontario, except in the Aylmer and Chatham areas in the southwest. Here the birds are still considered to be surviving wild stock. A mail survey suggested that populations may have declined to only about 185 birds in only 16 coveys in the late 1980s (Hunter 1990).

The estimates of numbers at that time were based only on the mail survey. Apparently many landowners have bobwhite on their places and do not know it (R. Ludolph, pers. comm.). There are also areas where many birds would be missed, or no accurate numbers would have been available.

However, atlassing results and other observations suggest that natural, viable populations now exist in Canada only on Walpole Island. Surveys done on Walpole Island in 1999 and 2000 suggest a population of about 230 birds there.

Habitat loss to intensive agriculture and urbanization have resulted in declines through the 20th century. In the western Lambton County area where survival seems to have been high, there is good winter habitat and efforts are under way to provide more habitat that would provide higher winter survival, as well as enhanced summer reproductive potential.

TECHNICAL SUMMARY

Colinus virginianus

Northern Bobwhite

Range of Occurrence in Canada: ON

Colin de Virginie

Extent and Area Information (from Ontario Breeding Bird Atlas 1981-1985 and 2001-2003)	
• Extent of occurrence (EO)(km ²)	ca 28,000 km ²
• Specify trend in EO	probably stable
• Are there extreme fluctuations in EO?	no
• Area of occupancy (AO) (km ²)	less than 1000 km ²
• Specify trend in AO	declining
• Are there extreme fluctuations in AO?	No
• Number of extant locations	n.a.
• Specify trend in #	n.a.
• Are there extreme fluctuations in number of locations?	n.a.
• Specify trend in area, extent or quality of habitat	declining
Population Information	
• Generation time (average age of parents in the population)	2-3 years
• Number of mature individuals	certainly less than 1000, probably less than 500
• Total population trend:	declining
• % decline over the last/next 10 years or 3 generations.	88% (Breeding Bird Survey)
• Are there extreme fluctuations in number of mature individuals?	No
• Is the total population severely fragmented?	Yes
• List populations with number of mature individuals in each (from addendum)	Walpole I.: 230 Other small, scattered populations, many (?) the result of repeated introductions
• Specify trend in number of populations	decrease of 76% since 1985 (Ontario Breeding Bird Atlas)
• Are there extreme fluctuations in number of populations?	No
Threats (actual or imminent threats to populations or habitats)	
- continued loss of agricultural and native prairie habitat - degradation of habitat through increase in size of individual cultivated fields, loss of fencerows, loss and increasing isolation of brushy cover - food sources depleted through pesticides and herbicides - increasing predator (house cat, raccoon, fox, coyote, skunk, opossum) populations - dilution of native gene pool through repeated reintroductions from varied stocks	

Rescue Effect (immigration from an outside source)	LOW
• <i>Status of outside population(s)?</i> USA: Declining [other jurisdictions or agencies] present in Mexico but status unknown	
• <i>Is immigration known or possible?</i>	Unlikely
• <i>Would immigrants be adapted to survive here?</i>	Yes
• <i>Is there sufficient habitat for immigrants here?</i>	Declining
• <i>Is rescue from outside populations likely?</i>	No
• <i>If the species is extirpated in Canada, is suitable stock available from outside Canada for reintroduction?</i>	Yes, though genetic purity is questioned
Quantitative Analysis	n.a.
Current Status	COSEWIC: Endangered

Other sources of information : Addenda by Richard J. Cannings, COSEWIC Bird SSC Co-chair and Ontario Ministry of Natural Resources

Status and Reasons for Designation

Status: Endangered	Alpha-numeric code: A2b; C1, C2ai also meets criteria for Threatened A2c, B2a, B2bii, iii, iv, v and D1
Reasons for Designation: This species depends on native prairie and old meadow habitats that have largely disappeared from its southern Ontario range. Its population has declined drastically over the last 30 years and shows no sign of significant recovery. There is perhaps only one viable population in Canada, on Walpole Island, Ontario. The status of this species is complicated by the presence of many introduced populations which typically do not persist and whose genetic composition may pose a threat to native populations.	

Applicability of Criteria:

Criterion A (Declining Total Population): A2b: meets Endangered > 50 % decline.

Criterion B (Small Distribution, and Decline or Fluctuation): Meets Threatened B2b (ii, iii, iv,v).

Criterion C (Small Total Population Size and Decline): Probably meets Endangered C1 (population <2,500) but the numbers from Walpole Island are difficult to determine.
Almost meets C2a(ii).

Criterion D (Very Small Population or Restricted Distribution): Meets Threatened D1, based on small population.

Criterion E (Quantitative Analysis): not available

ACKNOWLEDGEMENTS

Thanks to Colleen Hyslop for the opportunity to prepare this report, and to the Canadian Wildlife Service for arranging funding. Special thanks to Pud Hunter of the Aylmer office and Ron Ludolph of the Chatham office of the Ministry of Natural Resources for discussions relating to the situation with respect to habitat and possible reintroductions in southwestern Ontario. Thanks also to Don Sutherland of the Natural Heritage Information Centre for comments and for providing information from U.S. Conservation Data Centers.

This report was substantially revised by Richard Cannings in 2003, with extensive new information provided through an addendum prepared by Chris Risley, Don Hector, Pud Hunter, Ron Ludolph, Hal Schraeder, Allen Woodliffe and Alan Dextrase of the Ontario Ministry of Natural Resources in August 2003.

LITERATURE CITED

- Brennan, L.A. 1991. How can we reverse the Northern Bobwhite population decline Wildl. Soc. Bull. 19:544-555.
- Brennan, L.A. 1999. Northern Bobwhite (*Colinus virginianus*). In The Birds of North America, No. 397. (A. Poole and F. Gill, eds.). The Birds of North America Inc., Philadelphia, PA.
- Bolger, D.T., A.C. Alberts, and M.E. Soule. 1991. Occurrence patterns of bird species in habitat fragments: sampling, extinction, and nested species subsets. Amer. Nat. 137:155-166.
- Burger, L.W., Jr., T.V. Dailey, E.W. Kurzejeski, and M.R. Ryan. 1995. Survival and cause-specific mortality of Northern Bobwhite in Missouri. J. Wildl. Manage. 59:401-410.
- Clarke, C.H.D. 1954. The Bob-white Quail in Ontario. Tech. Bull., Fish and Wildl. Serv. No. 2, Ont. Dept. Lands and Forests.
- De Vos, T., Jr. and D.W. Speake. 1995. Effects of released pen-raised Northern Bobwhite in survival rates of wild populations of Northern Bobwhite. Wildl. Soc. Bull. 23:267-273.
- Guthery, F.S. 1997. A philosophy of habitat management for Northern Bobwhites. J. Wildl. Manage. 61:292-301.
- Hector, D. (in prep.) Technical report on Northern Bobwhite surveys conducted by Rural Lambton Stewardship Network in 1999-2000. Unpublished report, Ministry of Natural Resources, Chatham.
- Holdsworth, C. 1973. Winter study of Bobwhite Quail in southwestern Ontario, 1972-1973. Unpubl. Rept. to Ont. Min. Nat. Res.
- Hunter, P. 1990. OMNR – SW Region Bobwhite Quail rehabilitation project. Unpubl. Rept., Aylmer Dist. Ont. Min. Nat. Res.

- Lumsden, H.G. 1987. Northern Bobwhite (*Colinus virginianus*). In Atlas of breeding birds of Ontario (M.D. Cadman, P.F.J. Eagles, and F.M. Helleiner, eds.). Univ. of Waterloo Press, Waterloo, ON. Pp. 144-145.
- MacIntyre, K. 2002. A Technical Report Outlining the Status of Northern Bobwhite (*Colinus virginianus*) in the Aylmer District, Ontario Ministry of Natural Resources. Unpublished report, Ministry of Natural Resources, Aylmer, 14 p. + 4 app.
- Page, A.M. and M.J. Austen. 1994. Status report on the Northern Bobwhite *Colinus virginianus* in Canada. COSEWIC, Ottawa.
- Robel, R.J. and K.E. Kemp. 1997. Winter mortality of Northern Bobwhites: effects of food plots and weather. *Southwest Nat.* 42:59-67.
- Roseberry, J.L. and W.D. Klimstra. 1984. Population ecology of the bobwhite. Southern Illinois Univ. Press, Carbondale, IL.
- Roseberry, J.L., D.L. Ellsworth, and W.D. Klimstra. 1987. Comparative post release behavior and survival of wild, semi-wild, and game farm bobwhites. *Wild. Soc. Bull.* 15:449-455.
- Rosene, W. 1969. The bobwhite quail: its life and management. Rutgers Univ. Press, New Brunswick, NJ.
- Statistics Canada. 1997. 1996 census of Canada: historical overview of Canadian agriculture.

BIOGRAPHICAL SUMMARIES OF THE REPORT WRITERS

Ross James is a Departmental Associate and former Curator of Ornithology at the Royal Ontario Museum in Toronto, Ontario. He studied the foraging behaviour of vireos in southern Ontario, and the ecological and behavioural relationships of Blue-headed and Yellow-throated Vireos for master's and doctoral research at the University of Toronto. He has also conducted bird population studies in boreal forest and southern woodlands and wetlands. He is interested in the status and distribution of birds in Ontario, authoring an Annotated checklist of Ontario Birds, and coauthoring two volumes on the Breeding Birds of Ontario. He was a committee member for and a contributor to the Atlas of Breeding Birds of Ontario, and a coauthor of Ontario Birds at Risk. He is an author of two accounts for the Birds of North America, and has published more than 80 papers on birds. He spent more than a decade as chair and co-chair of the Birds Subcommittee of COSEWIC. In this capacity he was familiar with previous status reports and the status of this species.

Richard J. Cannings has a B.Sc. in Zoology from the University of British Columbia and an M.Sc. in Biology from the Memorial University of Newfoundland. He was Assistant Curator of the Cowan Vertebrate Museum at the University of British Columbia for 15 years, and is now a consulting biologist living in the Okanagan Valley. He works part-time for Bird Studies Canada, coordinating the Christmas Bird Count across the country and other bird monitoring programs in British Columbia. Although his primary focus is on bird

biology, he has a broad interest in natural history and coauthored "British Columbia: A Natural History" with his brother Sydney. He has been co-chair of the Birds Specialist Subcommittee of COSEWIC since 2001.

AUTHORITIES CONSULTED

Pud Hunter, OMNR, 353 Talbot St. West, Aylmer, ON. N5H 2S8.
Ron Ludolph, Lambton Stewardship Council, c/o OMNR, P.O. Box 1168,
Chatham, ON. N7M 5L8.
Don Sutherland, Nat. Heritage Information Centre, 300 Water Street,
P.O. Box 7000, Peterborough, ON. K9J 8M5.
Alan Woodliffe, OMNR, P.O. Box 1168, Chatham, ON. N7M 5L8.